# USMC AMMUNITION QUARTERLY

Volume 6, No. 4 Marine Corps Information Publication October 2000


# From the PM for Ammunition


**Mr. Jerry L. Mazza**
***MARCORSYSCOM- AM***


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As this is the first edition of the Ammunition Quarterly for FY01, I thought it appropriate to lead with an article on the Modular Artillery Charge System (MACS). CWO3 Barack provided an interesting and detailed article on the introduction of this new propellant. I believe the MACS and new M795 155MM artillery projectile will certainly compliment the LW155 Howitzer when fielded.

You will note however that the focus of this edition is Maintenance and Surveillance of ammunition and explosives within the Marine Corps stockpile. I asked CWO4 Patterson to prepare an article for this edition primarily because the efforts put forth by the Quality Assurance and Maintenance Branch serve as a pivotal and critical element in the Life Cycle Management of our munitions stockpile.

Putting ammunition in the right place, at the right time, in sufficient quantity falls short if it lacks the reliability for those who must depend on it. As such, we conduct an extremely dynamic and robust stockpile reliability program to ensure our munitions function as designed, when needed. The relatively small investment to have the visibility across all families of Marine Corps Ground Ammunition has and will continue to pay dividends, both in the management of the stockpile as well as readiness for our Marine Forces.

In the July 2000 edition of the Ammunition Quarterly, I discussed FY01 Guiding Principles for Ground Ammunition. My intent was to include those in this edition however; this document will be placed on the PM Ammo webpage once finalized. I would encourage all who have a vested interest in our commodity to take a few minutes and review it. I am confident that it will touch virtually every aspect of the way this office conducts business by providing Class V (W) support to the entire Marine Corps.

Finally, I would like to say farewell to one of my senior staff, Ms. Diane Smith. Diane has supported this office in excess of 8 years as the Plans Branch Head and most recently, as the Logistics Division Head. She has taken a position and a promotion with the Executive Director for Conventional Ammunition, AMC, Alexandria, VA. Many of you who have had the pleasure of working with her know she has contributed significantly to the Operational Planning of our business. We wish her well. Ω

***Semper Fi***

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# Modular Artillery Charge System (MACS)

**CWO3 P. Barack**
***MARCORSYSCOM-AM/RD&A***

The Modular Artillery Charge System (MACS) consists of two propelling charges, the M231 (DODIC DA12) and the XM232 (DODIC DA13). MACS is intended to replace the M3A1, M4A2, M119A2, and M203A1 155MM artillery propelling charges throughout the Marine Corps and Army inventory.

Although MACS is being optimally designed for use in the Army's CRUSADER, the next generation self-propelled field artillery system, it is also compatible with the M198 towed howitzer, as well as the XM777 lightweight towed howitzer that is currently in development.

MACS will provide the Marine Corps with a superior propellant system for its 155MM field artillery force. In addition to providing a substantial increase in performance, MACS provides increased operational flexibility and reduced support costs for the entire Fleet Marine Force.

MACS design employs a "build-a-charge" concept that eliminates the need to dispose of unused charges (unlike current bag charges, unused MACS charges can be saved for future firings). The button-charge, M231 is fired either singly or in pairs to engage targets from 3 to 12 kilometers. The top-charge, XM232 is fired in multiples of 3 or higher. Charge 5 can be fired from all weapons to engage targets over 28 kilometers. Only CRUSADER's extended range cannon can fire charge 6 to engage targets over 40 kilometers.


M231 PROPELLING CHARGE & ITS ASSOCIATED PACKAGING


XM232 PROPELLING CHARGE & ITS ASSOCIATED PACKAGING

The M231 and XM232 are never mixed, so both charges and their associated packaging have design differences to facilitate distinguishability. This enables the Marine to differentiate the two charges visually and tactilely. For example, all of the M231's components (charge, canister, etc.) are green while the XM231's components are tan. The markings are different and the M231 also includes four black contrast bands that are visible under low-light conditions. M231's are also noticeably lighter than XM232's. The XM232 has four bumps on each end while the M231 is smooth. Internal packaging and container lids are also different.

The M231 and XM232 are both designed with center-core igniter and main charge propellant enclosed within a rigid combustible case. The XM232 also includes additives to reduce flash, gun wear and barrel coppering. The center-core igniter is bi-directional, meaning that the charges can be loaded either end first (unlike the current family of propelling charges that must be loaded one way only). Also, unlike the existing family of propelling charges, all M231 charges are identical allowing them to be interchangeable (likewise with the XM232). As a result, the M231 or XM232 can be fired in any order and in any orientation. The M231 and XM232 cases have an environmental coating on the exterior that allows the charges to withstand out-of-pack exposure for at least seven days.

The unique packaging system allows for easier handling. The canisters have a quick-opening lid for faster access

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***MACS….continued from Page 2***

Time. Once opened, the internal packaging sleeves containing the charges can be removed to allow transfer into the cannon. The packaging system allows long-term storage of the charges, and has no vehicle transportation limitations. The most beneficial feature is its ability to further reduce the reaction from an unplanned stimulus via a system of dividers and vents.

MACS is an Acquisition Category III Program managed by the Product Manager for Crusader Munitions. Industry partners' currently include: Armtec Defense Products, ATK, Expro Chemicals, Primex Technologies, Valentec Systems, and Hitech.

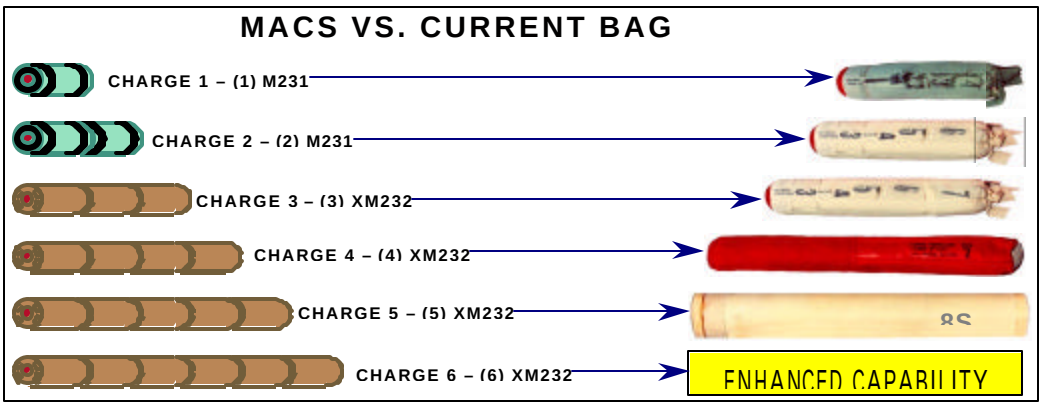
XM232 is currently undergoing developmental and further qualification testing for blast overpressure and has not been type-classified.

In the current POM 02 (Program Objective Memorandum) Budget, the Marine Corps will begin buying MACS in FY 2003. With a 24-month lead-time (administration/production), MACS will be introduced into the Marine Corps inventory during FY 2005. Ω

*CWO3 Barack is assigned to the RD&A Branch at MARCORSYSCOM (AM) and may be reached at DSN 278-9397 or Comm (703) 784-9397.*

## MODULAR ARTILLERY CHARGE SYSTEM

| M231 | Model Number | XM232 |
|---|---|---|
| Low-Zone | Charge-Type | Top-Zone |
| 1 & 2 | Zones | 3, 4, 5, & 6 |
| Green w/Black Bands | Color | Light Brown (Tan) |
| 152.4mm (6.00") | Length | 156.0mm (6.14") |
| 154.9mm (6.10") | Diameter | 152.4mm (6.00") |
| Cylinder w/Flat-Ends | Shape | Cylinder w/Bump-Ends |
| 1.93 kg (4.25 lbs) | Weight | 2.65 kg (5.85 lbs) |
| PAP7993 single-base (multi-per granular) | Main Charge Propellant | M301A1 triple-base (multi-per granular) |
| Bi-directional Igniter Exterior Coating No Additives | Other Features | Bi-directional Igniter Exterior Coating Additives (reduce Coppering, Flash, & Wear) |
| Canister: PA161; 17.2 kg (38 lbs) fully loaded; 4 charges per canister; 2 charges per sleeve | Packaging | Canister: PA103E2; 23.1 kg (51 lbs) fully loaded; 5 charges per canister; 5 charges per sleeve |
| DA12 1320-01-454-4603 | DODIC/NSN | DA13 1320-01-457-4063 |



# Ordnance disposal area to get face-lift

***Reprinted from Stars and Stripes***
***July 2000, article by Greg Tyler***
***Provided by Mike Mullens, ESO***
***MCAS Iwakuni***

A U.S. military facility on Himeko-jima (Target Island), an island about one mile east of Iwakuni Marine Corps Air Station, is in line for a major face-lift. "Since the 1960's the facility has been used by the U.S. as an explosive ordnance disposal area under the conditions allowed for by the SOFA (Status of Forces Agreement)," said Gunnery Sgt. Lawrence Torres, Iwakuni spokesman.

The 10,000 square-foot island was used as a Japanese live-fire target island during WWII. The U.S. military uses the island to dispose of ordnance from MCAS Iwakuni and Akizuki, an Army ammunition depot near Kure, according to Master Sgt. Eudith Rodney, a U.S. Forces Japan spokeswoman. There may also be emergency and special conditions where ordnance from other U.S. facilities may have to be disposed of at Himeko-jima. "We have not disposed of any non-MCAS Iwakuni or Akizuki ordnance here in the last year," Rodney said.

If construction contracts are approved as expected in August, USFJ will build an explosive disposal facility using the latest safety technology. "The purpose of this project is not to increase capability or to dispose of any ammunition that we do not already dispose of per the SOFA and joint-use agreements in place," Rodney said. "Many negotiations with the government and local government have been conducted to ensure all concerns with this project have been addressed, while ensuring the design of the facility will meet the safety requirements of the personnel who occasionally work on the island."

The military does not conduct live-fire training on the island. However, disposal of ammunition does occur either by incineration or by explosive detonation.

The U.S. government will pay for the project, with construction expected to last three or four months.

*Target Island peak elevation 500 feet above sea level*

The project consists of three components:

- Build up a surface area that would provide a flat space to conduct the incineration or explosive operation.
- Build an enclosed concrete holding area that would temporarily store ordnance until it is moved to the incineration/explosive area for disposal.
- Build an enclosed concrete shelter for personnel during actual incineration or explosive operations.

In early July, Jungen Tamura, leader of the Iwakuni City workers' Peace Research Center, asked the Mayor of Iwakuni and Col. Richard Dunn, Iwakuni's commander, to halt the process. On July 19, Tamura said, "The commander of Iwakuni called a meeting with the mayor of Iwakuni to explain what is going to happen on the island. The commander clarified that the new facilities will be built for protecting the environment around the island. Especially, they want to prevent sand from flowing into the ocean from the island by installing embankments." Tamura said it had seemed to him "they wished to build a pier to anchor down ships carrying explosives." But in the meeting with the mayor, he added, Dunn promised they would not build a pier. "That really relieves me, because as long as they have to carry explosives on foot, a tremendous increase in the explosives carried to the island would not happen," Tamura said. Ω

*Mr. Mullen is currently the Explosives Safety Officer at MCAS Iwakuni and may be reached at DSN 253-5048, email: mullenm@iwakuni.usmc.mil.*

# Quality Assurance and Maintenance

**CWO4 T. Patterson**
***MARCORSYSCOM/AM/QA&M***

Quality as a goal is one of those intangible aspects of any organization that all commodity managers must pursue. Quality must be an organizational effort that all members subscribe to and seek to achieve. Yet, unlike other objectives that have a beginning and an end-state, quality is a constant process, the pursuit of quality never ends.

The mission of the Program Manager for Ammunition (PM-AMMO) is to provide ***quality*** ground ammunition to Marine Forces when and where they are required. To assist in the accomplishment of this daunting task, the Quality Assurance and Maintenance Branch is charged with the three guiding principals:

1. *Identify the current condition of the stockpile.*
2. *Ensure only quality ground ammunition is delivered to the Marine Corps inventory.*
3. *Maintain the stockpile in the highest state of readiness possible.*

Each of these is accomplished via a series of programs and processes administered by the Quality Assurance and Maintenance Branch utilizing engineering and technical support from Naval Surface Warfare Center Crane Division Marine Corps Department Code 403 and Marine Corps Programs Department (MCPD) Code 409.

Conservative estimates value the current Marine Corps Class V (W) stockpile at approximately $5,000,000,000. First and foremost, the PM must know the true current condition of this valuable commodity in order to make sound and effective stockpile management decisions. So, what condition is Marine Corps Ammunition in at this time? The table below reflects the percentage of serviceable assets by ammunition family currently available to the war-fighter for training and operations.

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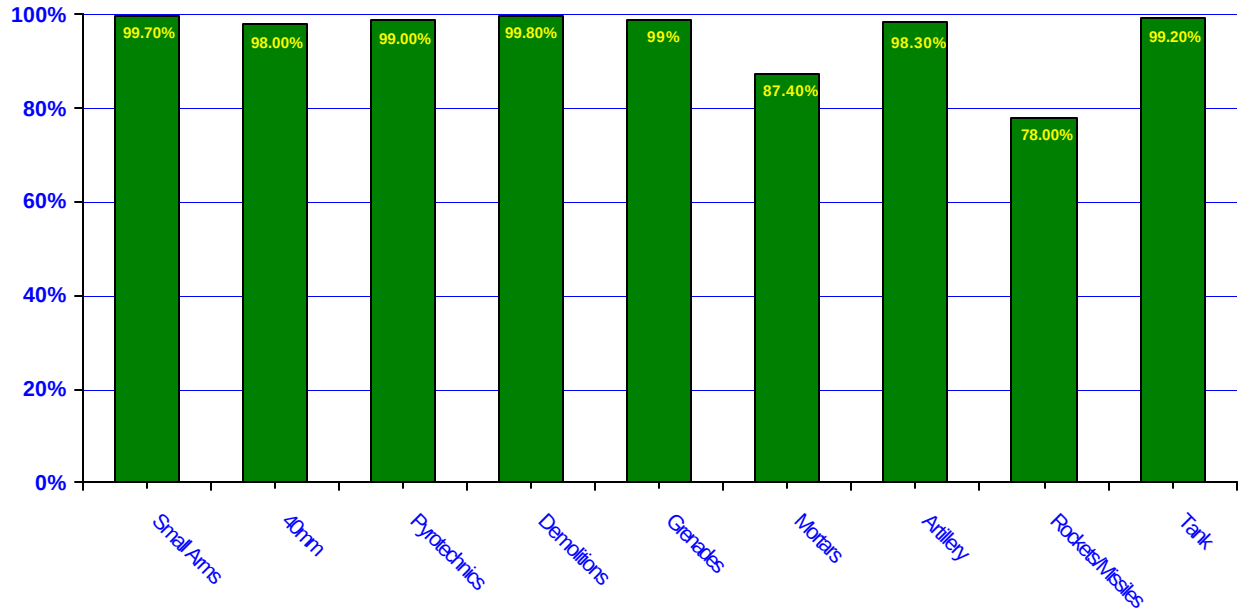
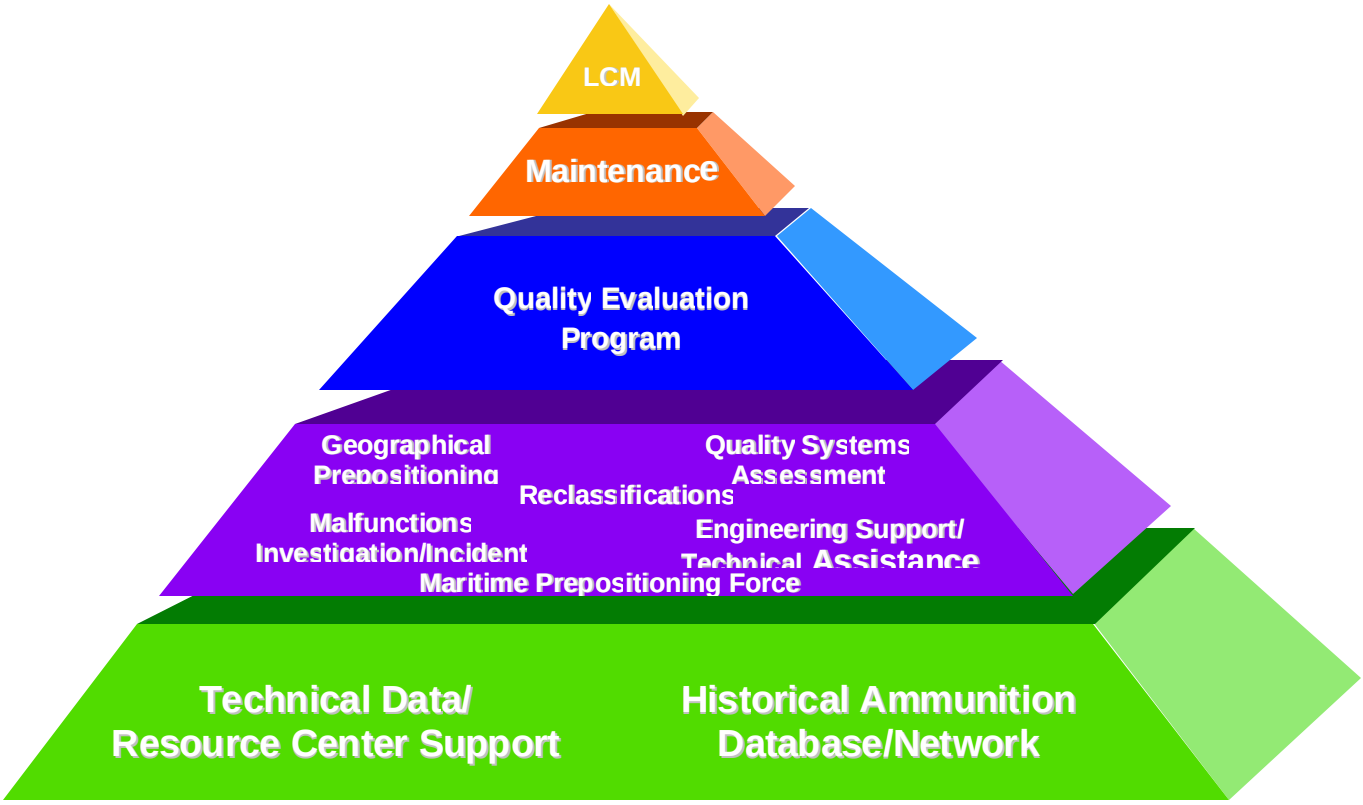


***QA&M…continued from Page 5***

PM-AMMO is able to determine the state of the stockpile through several programs as shown in this Life Cycle Management pyramid.




The Quality Evaluation Program measures the Reliability, Availability, Maintainability and overall Quality (RAM-Q) of a particular DODIC. RAM-Q reports are the result of surveillance inspections, functional testing, and laboratory analysis of representative lot samples of the inventory. Quantity, storage locations (environmental exposure), age, malfunction history and manufacturing variables are considered when selecting samples to arrive at a statistically significant means of determining reliability (future performance) at a given confidence level.

Each year, QAM schedules specific DODICS to be assessed in this manner. Lot samples are selected and positioned at test sites for evaluation. From these reports the overall state of the stockpile can be determined at the lot number level. Then inventory management decisions such as; reclassification, global positioning, priority issue, and maintenance options can be implemented by the PM-AMMO staff.

Several other programs are used to support this process. The Malfunction and Reclassification Programs incorporate a detailed historical database of each lot number. All reported malfunctions and investigation results are added to the historical database and used in stockpile analysis. In addition, all Army, Navy and Air Force Notices of Reclassification, Ammunition Information Notices are reviewed and analyzed for Marine Corps stockpile impact.

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***QA&M…continued from Page 6***

The Maritime Pre-positioning Force and Geographical Positioning programs inspect, review, and when necessary replace Marine Corps assets aboard MPF and LFORM ships as well as OCONUS storage sites. These programs strive to maintain our best stocks at these locations.

All of these programs are designed to provide the PM with the true condition of the Marine Corps Class V (W) inventory and carry out the first guiding principal of the Quality Assurance and Maintenance Branch.

One of the many benefits of the Quality Assessment Program is that it provides the PM-Ammo with the availability status based on the Total Marine Requirement. From this, the number of rounds needed over the next 5-7 years, can be determined. In many cases this will drive the Research, Development and Acquisition Branch to initiate procurement actions. This is where the second guiding principal: "Ensure only Quality Ammunition is delivered to the Marine Corps inventory" enters the process. To ensure this principal is carried out PM-AMMO conducts the Quality Systems Assessment Program, under the direction of the MCLNO Rock Island IL. The liaison schedules engineers and quality experts at Marine Corps Programs Department, NSWC Crane Division, Detachment, Fallbrook (MCPD) to conduct quality audits of ammunition manufacturers. This program evaluates the quality systems utilized by ammunition suppliers against current industry standards. These audits include evaluating both new production and renovation operations. The major element of this task is representing the Marine Corps in assessments of its ammunition suppliers and providing technical assistance in quality systems methodology as directed. This also includes participation in the joint service Contractor Performance Certification Program (CP)[2] coordinated by the U.S. Army Industrial Operations Command's (OSC).

Quality Audits of suppliers are conducted that include the following:

a. Review supplier's quality system for compliance with contract, specifications, and industry standards.

b. On-site audits of suppliers for compliance with quality system requirements.

c. Audits and reviews of maintenance lines, as directed.

d. Participation in multi-service audits as the Marine Corps representative.

e. Participation in the OSC's joint service meetings.

f. Reports on the results of the audits and other reviews and assessments, including areas of compliance/non-compliance.

MCPD personnel also provide Contract support to:

a. Monitor the OSC's management of the quality assessment programs utilized for Marine Corps buys.

b. Provide written correspondence when concerns arise.

c. Participate in Pre- and Post-Contract Award and Facility reviews.

d. Review contract deliverables (e.g. SPC Plans, QA Program Plans, etc.), as directed.

e. Review solicitations to ensure Marine MIPRS are included.

Additionally, MCPD participates in First Article Tests (FAT) and Lot Acceptance Tests (LAT) including reviewing FAT/LAT reports as directed and conducts engineering documentation review and analysis of performance specifications, Engineering Change Proposals (ECP), Requests for Deviations and Waivers, and specification changes as they apply to ground ammunition programs.

Finally, MCPD serves as technical representation to U.S. Army Operations Support Command (OSC) Integrated Product Teams (IPT).

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*QA&M…continued from Page 7*

The third guiding principal in the PMAM QA program is to "Maintain the stockpile in the highest state of readiness possible". Look back at the serviceability chart and you will notice that each family has a small percentage that is not serviceable. Analysis is conducted on these stocks to see if any can be salvaged through rework, renovation, or modernization. The Ammunition Maintenance Officer coordinates and administers the Maintenance Program. Engineering and Technical support are provided by NSWC Crane Division Code 4033. Detailed analysis is conducted to determine if a Return on Investment (ROI) can be achieved by performing maintenance. On the average most maintenance projects yield between 15 and 20 to 1 ROI. This means between 15 and 20 rounds can be reworked for the cost of buying 1 new round.

Once a maintenance project is scheduled a complex process is begun to obtain replacement components, select a maintenance site, position assets and conduct a quality audit of the maintenance line. The Maintenance Program gives the PM an option to meet the requirement and avoid the excessive cost of new procurement. The chart below indicates the current status of the Maintenance Program.

Through Quality Evaluation of the stockpile, Quality Assessment of suppliers and an aggressive Maintenance Program, PM-Ammo is able to provide the Marine Corps with the safest, most reliable and effective ammunition stockpile possible. Ω

*CWO4 Patterson is assigned to MARCORSYSCOM/AM/QA&M branch and may be reached at DSN 278-9492 or Comm (703) 784-9492*

| DODIC | PROJECT | DESCRIPTION | | WORK LOCATION | TOTAL RDS |
|---|---|---|---|---|---|
| M757 | 98DM-3 | REPACKAGE M112A BLKS | | CAAA | 58,840 |
| M023 | 98DM-9 | EXTRUDE CLASS III | | CAAA | 941,440 |
| B542 | 00LG-3 | SCREENING | | NSWC | 670,288 |
| K180 | 00MN-1 | FUZE WELL | | TOOELE | 10,000 |
| PL87/89 | | STINGER SLEP | | NSWC CRANE | 5,730 |
| PB93 | 98MI-2 | TOW II (AMMO/CBG FUNDED) | | NSWC | 1,850 |
| J143 | 98RK-1 | ROCKET MOTORS | | CAAA | 3,218 |
| M913 | 99DM-5 | CONVERSION / COMPONENTS | | CAAA | 342 |
| M913 | 00DM-1 | RENOVATION | | MCAL | 225 |
| ML25 | 00DM-2 | RENOVATION | | MCAL | 157 |
| M913 | 00DM-3 | CONVERSION | | MCAL | 400 |
| M913 | 01DM-3 | CONVERSION | | CAAA | 400 |
| C871 | 01MO-1 | PRIMER/PROP/FIN | | TBD | TBD |
| PL94/95 | | UMBILICAL UPGRADE | | NSCW CRANE | 775 |
| G881 | 00GR-1 | FUZE | | TBD | 212,073 |
| K867 | | CORROSION | | TBD | |
| B643 | | PRIMER/FIN/PROP | | TBD | |
| A555 | | DELINK | | TBD | |
| M500 | | POP MARKINGS | | TBD | |
| | YELLOW | IN WORK | | | |
| | GREEN | FUNDED | | | |
| | TEAL | AMMO & CBG PROGRAM | | | |
| | GRAY | PLANNED | | | |

**Ammunition Quarterly**

Marine Corps Ammunition Information Publication

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